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10/516,380	11/30/2004	Toshiki Makimoto	14321.63	2860

22913 7590 07/11/2007
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EXAMINER

NGUYEN, TRAM HOANG

ART UNIT	PAPER NUMBER
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2818

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary

Application No.

10/516,380

Applicant(s)

MAKIMOTO ET AL.

Examiner

Tram H. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 50-60 and 77-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 50-60, 77-79 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

In response to the communications dated 04/23/2007, claims 50-60 and 77-79 are pending in this application.

Response to Arguments

In response to applicant's argument that 04/23/2007, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 50-60 and 77-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Makimoto et al. (US 2002/0195619).

Regarding **claim 50**, Makimoto et al. disclose a nitride semiconductor structure (fig. 10) comprising: on a substrate (item 101); an n-type collector layer (item 104); a p-type base layer (item 106) formed on said n-type collector layer (104); and an n-type emitter layer (107) formed on said p-type base layer (106), an indium-containing p-type nitride layer (105) formed on a surface of said p-type surface (106), which is exposed by etching said n-type emitter layer (107); a base electrode (78) formed on the indium containing p-type nitride semiconductor layer (105).

Makimoto fails to teach the indium-containing p-type nitride semiconductor layer is regrown on said base layer surface. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include an indium-containing p-type nitride semiconductor layer regrown on the said base layer surface in the nitride semiconductor bipolar transistor structure as taught by Makimoto so that the electrodes ejected can pass through the indium containing p-type nitride semiconductor layer and reach the collector. Therefore, the device has a further

advantage of being able to increase the collector current; thereby achieving high current gain (par.[0029], lines 8-11).

Regarding **claim 51**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer is p-type InGaN. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer comprising p-type InGaN in the nitride stacked semiconductor as taught by Makimoto in order to reduce the cost of manufacturing device instead of using some other Indium containing p-type nitride semiconductor layer.

Regarding **claim 52**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Fig. 10 shows said p-type base layer is p-type InGaN (106).

Regarding **claim 53**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see fig. 10).

Regarding **claim 54**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of

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said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 55**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type base layer is p-type InGaN (see claim 52's rejection).

Regarding **claim 56**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see claim 53's rejection).

Regarding **claim 57**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby

increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 58**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see claim 53's rejection).

Regarding **claim 59**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 60**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride

semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polariziation; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 77**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item 104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Regarding **claim 78**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item 104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Regarding **claim 79**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item 104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tram Hoang Nguyen whose telephone number is (571)272-5526. The examiner can normally be reached on Monday-Friday, 8:30 AM – 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mathew Smith can be reached on (571)272-1657. The fax numbers for all communication(s) is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571)272-1625.

STEVEN LOKE
SUPERVISORY PATENT EXAMINER



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